

Problem and Objective Statements System Vulnerability

Problem

Settlers first constructed levees in the Sacramento-San Joaquin Delta during the late 1800's. Initially settlers built levees to turn tidal marshes into agricultural land and over time increased the levee heights to maintain protection as both natural settling of levees and shallow subsidence of Delta island soils (oxidation which lowers the level of land over time) occurred. The increased levee heights combined with poor levee construction, and inadequate levee maintenance makes Delta levees vulnerable to failure, especially during earthquakes or floods. Delta island farmland, wildlife habitat, and critical infrastructure can be flooded as a result of a levee failure. Delta islands adjacent to a large body of open water created by flooded Delta islands can be exposed to increased wave action, possible levee erosion, and increased seepage if the levee is not repaired and the flooded Delta island drained. Levee failure on specific Delta islands can have direct or indirect impacts on water supply distribution systems. Direct impacts result from flooding of distribution systems such as the Mokelumne Aqueduct and indirect impacts result from salty water moving up into the Delta, as an island is flooded. The increased salinity in the Delta would be of particular concern in a low water year when less freshwater would be available to drive back the incoming salt water. Long-term flooding of specific Delta islands can have an effect on water quality by changing the rate and area of the mixing zone. A long interruption of water supply for in-Delta and export use by both urban and agricultural users could result, until the salt water could be flushed from the Delta.

Local reclamation districts are concerned with the cost of maintaining and improving the Delta levee and channel system. The complex array of agencies with planning, regulatory, disaster assistance, and/or permitting authorities over levees and channels creates additional obstacles in rehabilitation and maintenance efforts. Regulatory measures which protect endangered species or critical habitat can further increase the vulnerability of the system. These measures can conflict with and prolong or defer important levee rehabilitation and maintenance work needed to maintain system integrity.

Objectives

The goal for addressing Bay-Delta system vulnerability is to reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic breaching of Delta levees. This goal is supported by several objectives which collectively seek to improve reliability of the levee system:

- Manage the risk to **existing land use** from seepage, instability, and overtopping of the levees, subsidence of organic soils and catastrophic

inundation of Delta islands

- Manage the risk to **in-Delta and export water supply** from sudden catastrophic island inundation and the resultant salinity intrusion
- Manage the risk to **in-Delta and export water supply** facilities from potential interruptions due to sudden catastrophic island inundation
- Manage the risk to existing **Delta ecosystem** from seepage, erosion, instability, and overtopping of levees, organic soils and catastrophic inundation and the resultant salinity intrusion

The vulnerability of the levee system to both general failure and sudden catastrophic failure can be reduced by implementing an integrated and comprehensive program for Delta levees and channels. This plan would need to streamline and consolidate the planning, regulatory, and permitting processes which affect the system, and provide a reliable funding source for system maintenance and rehabilitation.

Linkages

Improvements to levee system integrity are also directly linked to improvements for ecosystem quality, water supply reliability, and water quality.

Ecosystem Quality - An important aspect of reducing risk and making the system less vulnerable to failure will be to reduce the conflict between protection of wildlife habitat that occurs on levees, and maintenance of these levees to prevent failure. Riparian woodland, shaded riverine aquatic, and shallow water habitats are very important for fish and wildlife in the Delta, including threatened and endangered species. In many cases, objectives of reducing risk of catastrophic failure and protection of ecosystem quality can be achieved by incorporating habitat restoration and protection elements in levee system stabilization actions. The achievement of multiple objectives can occur through actions such as 1) adding landside and/or waterside stabilization berms, 2) controlling subsidence, and 3) beneficial reuse of dredge material. For example, efforts to improve stability through waterside or landside berms can provide areas for habitat restoration. Efforts to control subsidence through shallow flooding adjacent to the landside toe of the levee, also serves to create wetland habitat. In addition, stabilization of Delta levees through beneficial reuse of dredge material can provide disposal of this material as well as enhance Delta habitat. Both the Delta ecosystem (including the aquatic habitat and terrestrial habitat found on the levees and inside the islands) and system integrity can benefit from integrated planning of proposed levee stabilization and proposed habitat enhancement (riverine and riparian).

Water Supply Reliability - Steps to more effectively manage the risk associated with catastrophic failure of the Delta levees will reduce potential interruptions for in-Delta and export water supply thereby improving overall water supply reliability.

Water Quality - Steps to more effectively manage the risk associated with catastrophic failure of the Delta levees will reduce potential elevated Delta salinity levels that would degrade water quality for the ecosystem and for water supplies.

Phase II Alternatives

The three Phase II Alternatives were designed to address the Program objectives and to take advantage of the linkages from improvements in all four resource categories. Each alternative includes the Levee System Integrity Common Program which consists of several elements:

- Levee maintenance plan to reduce the vulnerability of Delta functions to inundation, improve flood capacity in high priority channels, and provide greater opportunities for habitat restoration.
- Stabilization of the highest priority Delta island levees can reduce the vulnerability of Delta functions to inundation and provide improvement in reliability of Delta water quality and water conveyance system while incorporating aquatic habitat restoration and enhancement features.
- Subsidence control plan increases long-term stability of existing Delta levees.
- Emergency levee management plan to reduce the severity of potential catastrophic events.
- Beneficial reuse of dredged materials can make improving levee integrity and levee associated habitat more affordable.